

Foraging of Glossy and Pygmy Swiftlets in Palawan, Philippine Islands

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In the Philippines, Glossy Swiftlets *Collocalia esculenta*, forage within 2 m of the ground in open areas while Pygmy Swiftlets *C. troglodytes* forage near canopy height. This seems to be a form of resource partitioning among similar-sized swiftlets.

Geographically sympatric multi-species assemblages of swiftlets *Collocalia* and *Aerodramus* [subsumed in *Collocalia* in Inskipp *et al.* 1996, *An annotated checklist of the birds of the Oriental region*] are common throughout their range in South-East Asia, Indonesia and the Pacific Islands (Medway 1962a, Rand and Gilliard 1968, Diamond 1972, Chantler and Driessens 1995). These swiftlets, like other Apodidae, feed on a diverse array of aerial arthropods (Medway 1962b, Harrison 1976, Langham 1980, Hails and Amirrudin 1981, Lourie and Tompkins in press, Collins and Francis in prep) with similar sized birds taking a similar range of prey sizes (Collins in prep). Accordingly, syntopic similar-sized swiftlets would be expected to show some form of resource partitioning. Altitudinal segregation between pairs of swiftlets has been recorded at several sites (Diamond 1972, Beehler 1978, Watling 1983, Coates 1985, Finch and McKean 1987): other mechanisms may also be present. This study examines the preferred foraging areas of two diminutive swiftlets, the Glossy Swiftlet *Collocalia esculenta*, and the Pygmy Swiftlet *C. troglodytes*, in an area of syntopy on Palawan, Philippine Islands.

The Glossy Swiftlet has an extensive range from the Andaman and Nicobar Islands eastward through Peninsular Malaysia, Indonesia, the Greater Sundas and northern New Guinea to the Bismarck, Admiralty and Solomon Islands (Rand and Gilliard 1968, Salomonsen 1983, Chantler and Driessens 1995, Sankaran 1998). The grey-rumped Philippine populations, studied here, have sometimes been considered as a separate species, *C. marginata* (Sibley and Monroe 1990, Chantler and Driessens 1995). The Pygmy Swiftlet, a Philippine endemic, is widespread in the archipelago, including Palawan (duPont 1971, Rabor 1977, Dickinson 1989, Dickinson *et al.* 1991). Although these two species appear nearly 'of the same size' (duPont and Rabor 1973), Glossy Swiftlets are slightly larger and heavier than Pygmy Swiftlets (Table 1.). The Glossy Swiftlet and Pygmy Swiftlet widely co-occur in many areas of the Philippine Islands (duPont 1971, Rabor 1977, Dickinson *et al.* 1991, Chantler and Driessens 1995) and appear to be ecologically syntopic as well.

Field observations of Glossy and Pygmy Swiftlets were made opportunistically at the St Paul's River Subterranean National Park, Palawan, during a more detailed study of the echolocation acuity of the co-occurring Palawan Swiftlet, *Aerodramus [vanikorensis] palawanensis* (Collins and Murphy 1994). Both Glossy and Pygmy Swiftlets were observed daily from 13-22 September 1990 in the vicinity of the park visitor

Table 1. Linear measurements and body mass of Glossy Swiftlets *Collocalia esculenta* and Pygmy Swiftlet *C. troglodytes* in the Philippines

	<i>C. esculenta</i>	<i>C. troglodytes</i>
Wing*	97-101 mm	90 mm
Tail*	42 mm	40 mm
Culmen*	4 mm	3.5 mm
Tarsus*	8 mm	9 mm
Mass**	7.1 g (6.3-8.3) n=5	5.4 g ± 0.48 SD (4.5-6.8) n=21

* from duPont (1971)

** from Dunning (1983)

facilities. More detailed observations of Glossy Swiftlet foraging were made from 20-22 September.

Even casual observations indicated that Glossy Swiftlets regularly flew, and were presumably foraging, at near ground level over cleared areas in the park as well as along paths through nearby brushy areas and over adjoining beaches. To quantify this, a pole marked in 1 m increments was erected in an area regularly used by Glossy Swiftlets to serve as a visual reference standard. The number of foraging flights made at 0-1, 1-2, 2-3 and greater than 3 m above ground level was then recorded. All data were collected as the number of flights noted in 11 fifteen-minute observation periods. As the swiftlets were particularly active between 06h00 and 09h30, 9 of the 11 were in this period and only two between 17h00-18h00, just before dusk. A total of 1,508 flights were scored in this manner (Table 2). As typical of swiftlets of several species (Medway 1962b, Coates 1985, Collins, pers. obs.), small groups of birds made repetitive flights over a similar route, or 'beat', perhaps 50-70 m long and 20 m wide. Since no birds were individually marked, an unknown number of swiftlets were involved, but typically from 4-5 and up to 10-12 individuals appeared to be present during each foraging period. Each swiftlet's flight path was probably recorded on multiple occasions during any one period and the total flight paths recorded are not entirely independent observations. As shown in Table 2 the preponderance (93%) of foraging flights of the Glossy Swiftlets in each observation period were made in the 0-1 and 1-2 m zones.

Pygmy Swiftlets were only observed foraging at the level of the forest canopy which, in the study area, was at a height of 15-20 m. In open areas where trees were more widely spaced, these swiftlets flew a bit lower

Table 2. Foraging heights of Glossy Swiftlets (*Collocalia esculenta*) in Palawan

Height above ground	Observation periods (15 minutes)											Total (%)
	1	2	3	4	5	6	7	8	9	10	11	
0-1 m	60	24	74	84	63	50	38	77	107	49	57	683 (45.29)
1-2 m	60	17	63	94	105	51	39	82	98	81	30	720 (47.75)
2-3 m	9	3	7	12	14	6	10	13	8	11	5	98 (6.50)
> 3 m	0	0	2	0	2	0	0	2	1	0	0	7 (0.46)
Total	129	44	146	190	184	107	87	174	214	141	92	1508
Time of day	PM	PM	AM	AM	AM	AM	AM	AM	AM	AM	AM	

around the edges of isolated trees but were never observed to drop much below canopy height in any foraging flight. The height of their flight paths was not quantified.

On 20 September Glossy and Pygmy Swiftlets were noted foraging in a mixed flock just south of the visitor area where a large tree had fallen on a steep seaward-facing hillside. This resulted in an opening in the forest with very low new brushy growth. A mixed flock, consisting of about 18 Glossy Swiftlets and 2 Pygmy Swiftlets, had established a foraging 'beat' there, roughly 30-40 m in diameter. At the innermost part of their circular route they were flying 1-2 m over the emergent growth, while at the outermost part of the route they were close to or just above the canopy of the tall forest trees growing much lower on the steep slope (Fig. 1.). This unique situation contained elements of what appeared to be the preferred foraging habitat of both species and was the only time they were observed foraging together.

In many parts of their range, Glossy Swiftlets have been noted by several observers to characteristically

forage low over open grasslands, cultivated ricefields and inside openings or clearing in forests (Medway 1962b, duPont and Rabor 1973, Diamond 1975, Rabor 1977, Hails and Amirrudin 1981). In New Guinea this species 'habitually flies at a lower level, closer to vegetation, and less swiftly, than other swiftlets: often low to the ground around clearings, along forest trails, and low over shores shaded by beach trees and coconuts' (Coates 1985). This is distinctly different from most other swiftlets, which typically fly higher over the forest canopy (Medway 1962b, Hails and Amirrudin 1981, Lourie and Tompkins in press). Pygmy Swiftlets have similarly been noted to use 'cultivated fields and open grassland areas with patches of dense tree growth' (Rabor 1977). However, no mention has been made of any differences in foraging height, even in areas where the two species occurred in close proximity (duPont and Rabor 1973). The long wings and tail and low body mass enable Glossy Swiftlets to 'forage much closer to vegetation than other swifts which demand more room to manoeuvre' (Hails and Amirrudin 1981). This would apply as well to the morphologically similar Pygmy Swiftlet (Table 1).

The pronounced non-overlapping foraging heights of Glossy and Pygmy Swiftlets noted in this area of syntopy seems to represent a form of resource partitioning which would allow them to exploit similar types and sizes of food items but in distinctly different microhabitats. However, it is difficult to show conclusively that such segregation is in fact the result of competitive interactions. In New Guinea, where the Pygmy Swiftlet does not occur, Glossy Swiftlets appear to forage in much the same manner as in Palawan, but also around the crowns of tall trees (Coates 1985). Similarly, in Kuala Lumpur, Malaysia, Glossy Swiftlets spend considerable time foraging at medium heights (>5m <50m) (Hails and Amirrudin 1981). These observations suggest that Glossy Swiftlets forage at a greater range of heights in areas of allotopy than in areas of syntopy with Pygmy Swiftlets. This would support the interpretation that the observed differences in foraging height of Glossy and Pygmy Swiftlets represents competition based resource partitioning. Further observations of foraging in other areas of syntopy of these two swiftlets were not possible during this brief trip; such data would be informative.

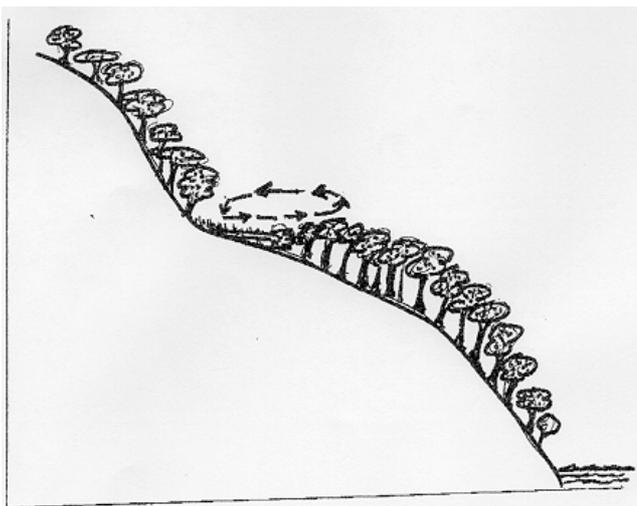


Figure 1. Flight path of mixed foraging flock of Glossy and Pygmy Swiftlets in tree-fall area, Palawan, Philippines Islands.

I would like to express my appreciation to The Cousteau Society for economic and logistic support for this research. Special thanks to the late Captain Cousteau for his interest in better understanding the biology of swiftlets in Palawan.

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